

Section 2.2. Biotic Environment

Figure 2.2-10: Photos of selected native invertebrate species occurring in subalpine and alpine habitat on Mauna Kea



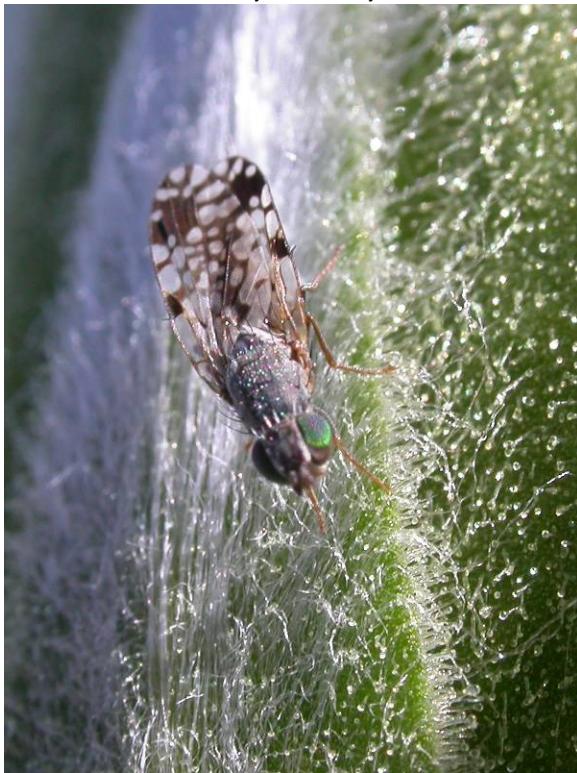
Wēkiu bug (*Nysius wekiuicola*)
Photo by Jesse Eiben



Lycosid spider (*Lycosa* sp.)
Photo by Peter Oboyski



Summit Agrotis moth (*Agrotis* or *Peridroma* sp.)
Photo by Jesse Eiben



Tephritid fly (*Trupanea arboreae*)
Photos by Idelle Cooper

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Koa bug (*Coleotichus blackburniae*)

Photo by Forest & Kim Starr



Kamehameha butterfly (*Vanessa tameamea*)

Photos by Forest & Kim Starr



Cydia moth (*Cydia plicata*)

Photo by Peter Oboyski



Agrotis noctuid moth (*Agrotis melanoneura*)

Photo by Jesse Eiben

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Thyrocopa moth (*Thyrocopa kikaeleaka*)
Photos by MJ Medeiros, courtesy of the British Museum of
Natural History



Thyrocopa moth (*Thyrocopa adumbrata*)
Photos by MJ Medeiros, courtesy of the British Museum of
Natural History



Yellow-faced bee (*Hylaeus flavipes*)
Photos by Jesse Eiben



Hawaii mamane long-horned beetle
(*Plagithmysus blackburni*)
Photos by Forest and Kim Starr

Notes: Images by Forest and Kim Starr available at: <http://www.hear.org/starr/hiinsects/images/index.html>. Images from Peter Oboyski available at: <http://nature.berkeley.edu/~poboyski/hawaii/insects.htm>.

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Figure 2.2-11: Photos of common invasive invertebrate species



Yellowjacket (*Vespula pensylvanica*)

Photo by David Foote, USGS



Honeybees (*Apis mellifera*)

Photo courtesy of USDA



Convergent ladybeetle (*Hippodamia convergens*)

Photo by Walter Siegmund¹



Argentine ant (*Linepithema humile*)

Photo by Peter Oboyski

¹ Ladybeetle photo from: http://commons.wikimedia.org/wiki/Image:Hippodamia_convergens_08084.JPG

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Monomorium pharaonis &
Tetramorium bicarinatum
Photos from antweb.org²

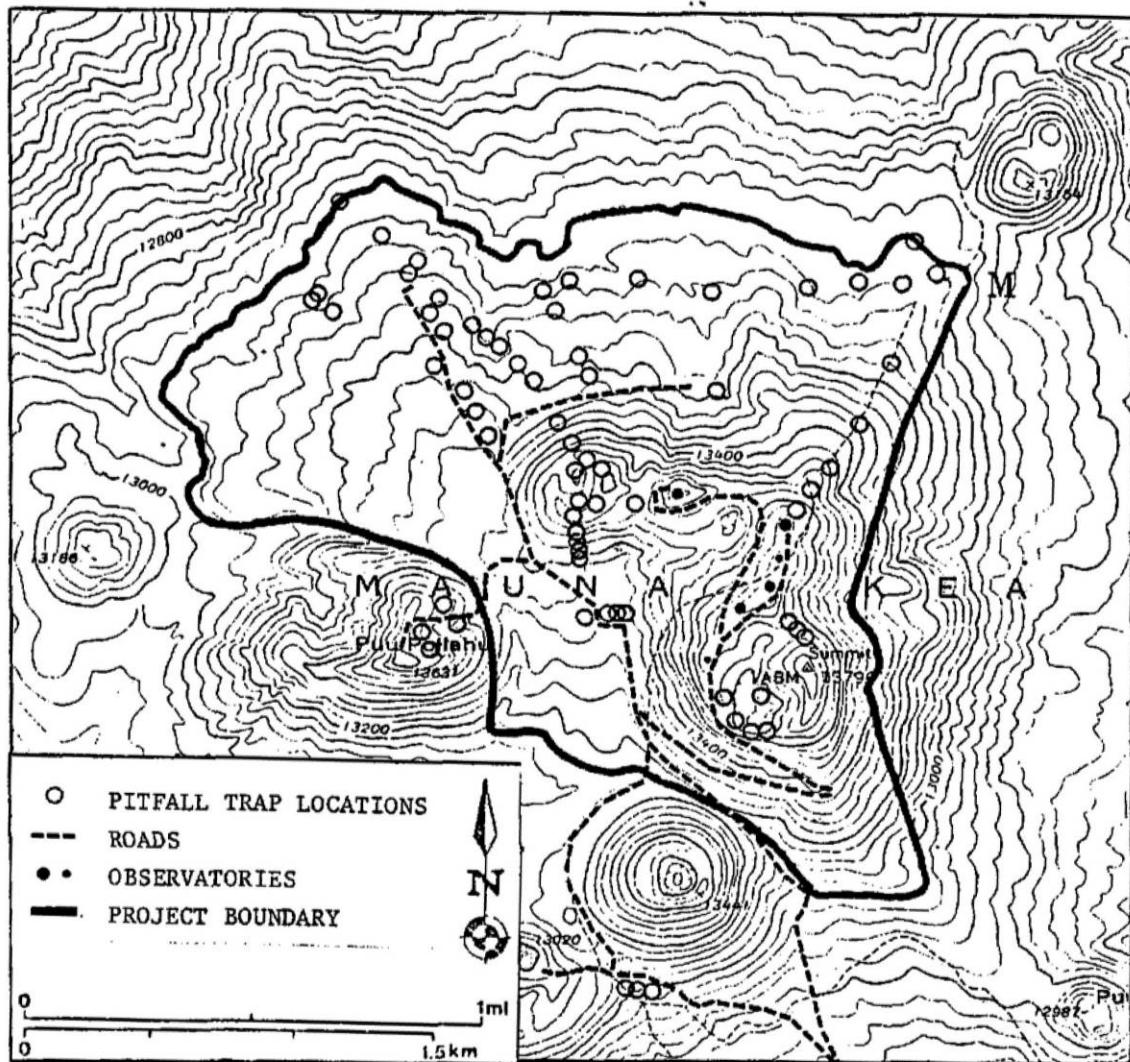


Cardiocondyla venustula &
Pheidol megacephala
Photos from antweb.org

² Photos credited to antweb.org are from the “Antweb field guide to ant species of Hawaii,” available online at <http://www.antweb.org/hawaii/species.pdf>

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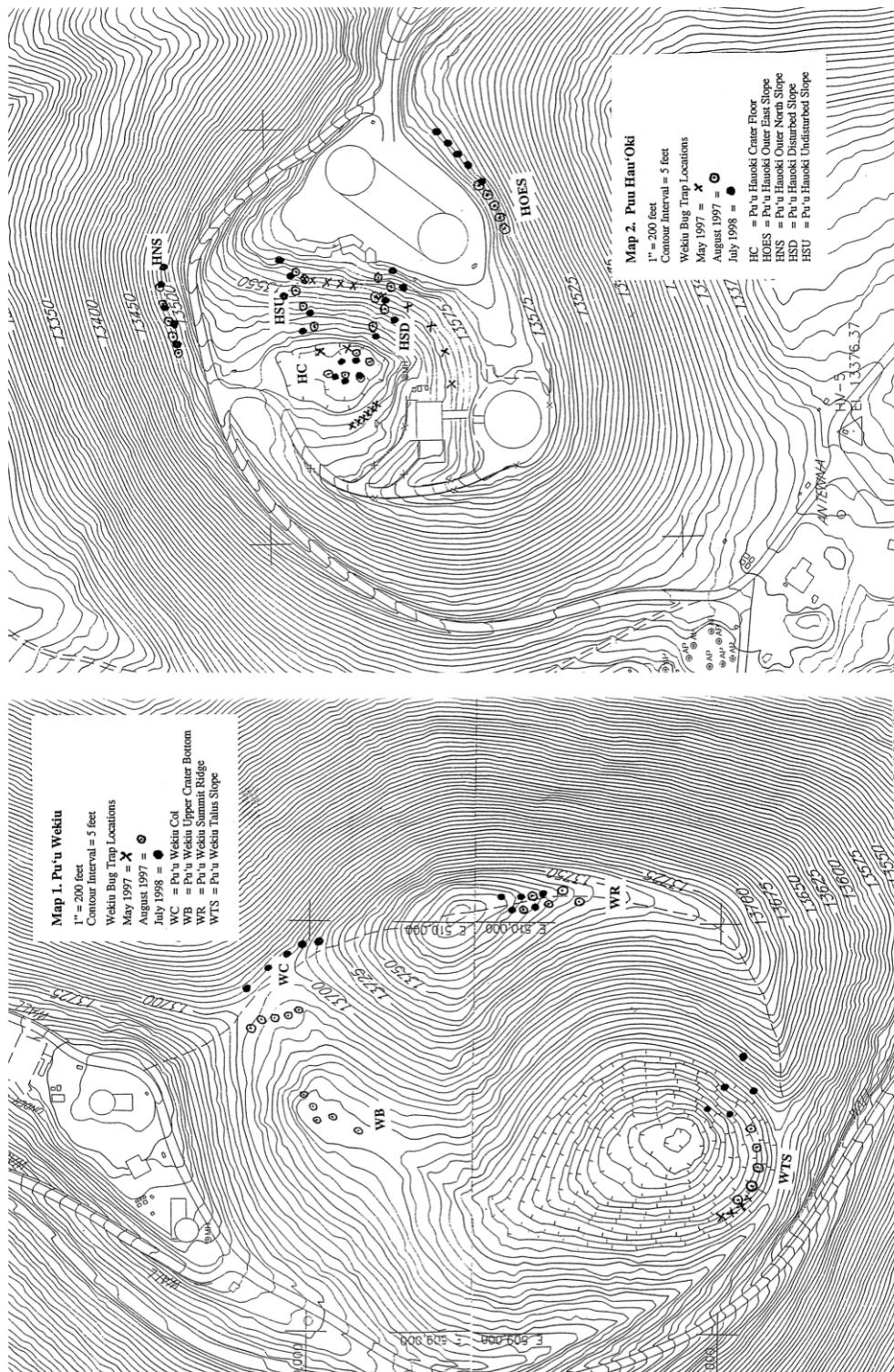
Figure 2.2-12: Howarth and Stone 1982 arthropod survey locations



Notes: Reproduced from: Howarth, F. G. and F. D. Stone. 1982. An assessment of the arthropod fauna and aeolian ecosystem near the summit of Mauna Kea, Hawaii. Submitted to Group 70. Bernice P. Bishop Museum, Honolulu. 18.

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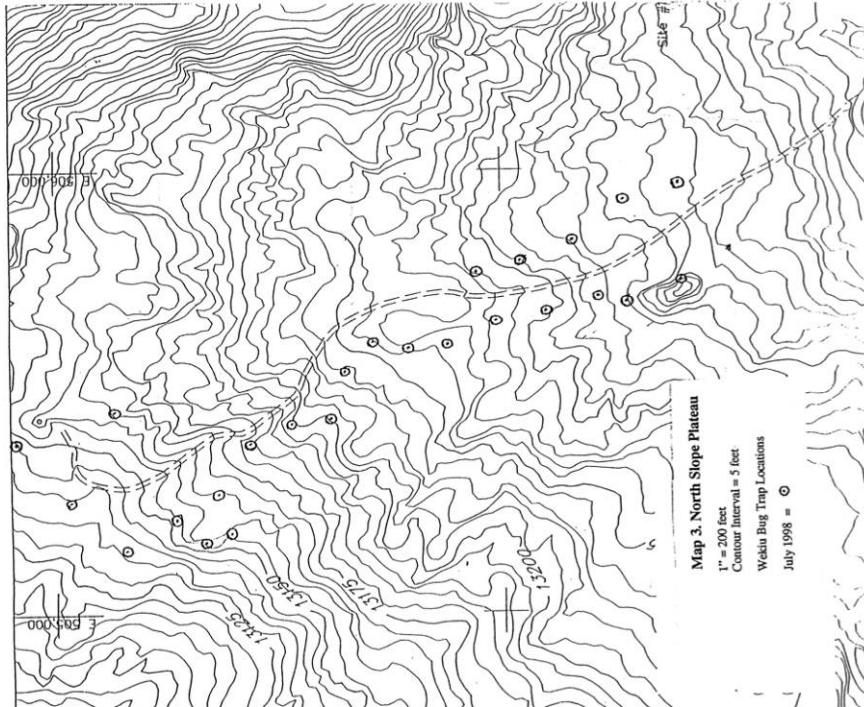
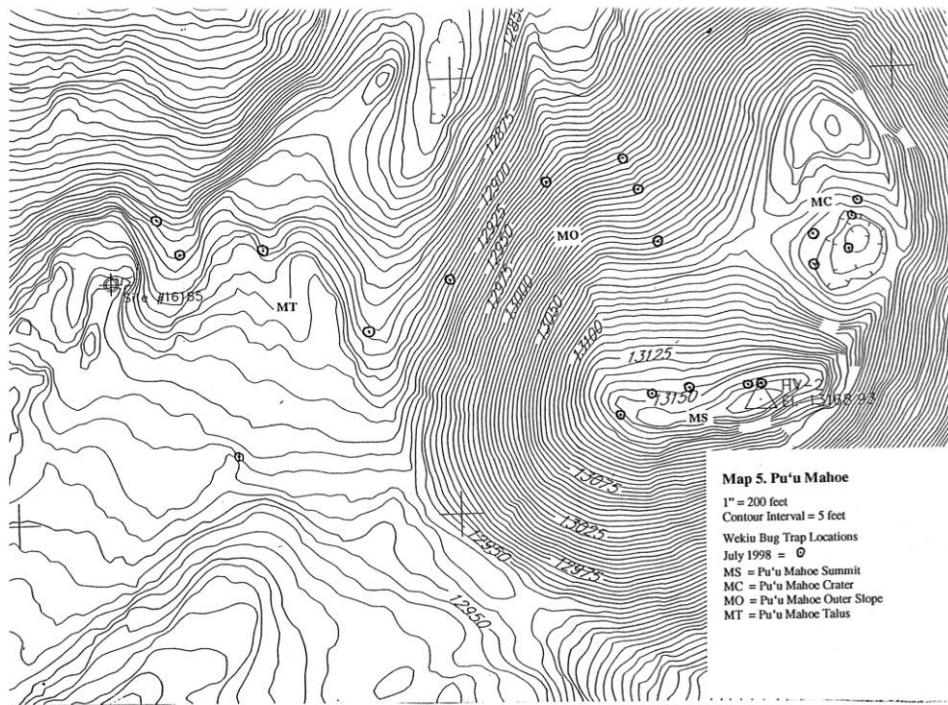
Figure 2.2-13: Howarth et al. 1997-8 arthropod survey locations: Pu'u Wēkiu and Pu'u Hau'ōki.



Notes: Reproduced from: Howarth, F. G., G. J. Brenner and D. J. Preston. 1999. An arthropod assessment within selected areas of the Mauna Kea Science Reserve. Final Report. Prepared for the University of Hawaii Institute of Astronomy. Appendix J in Group 70. 2000. Mauna Kea Science Reserve Master Plan. Bishop Museum and Pacific Analytics, Honolulu. 65 p.

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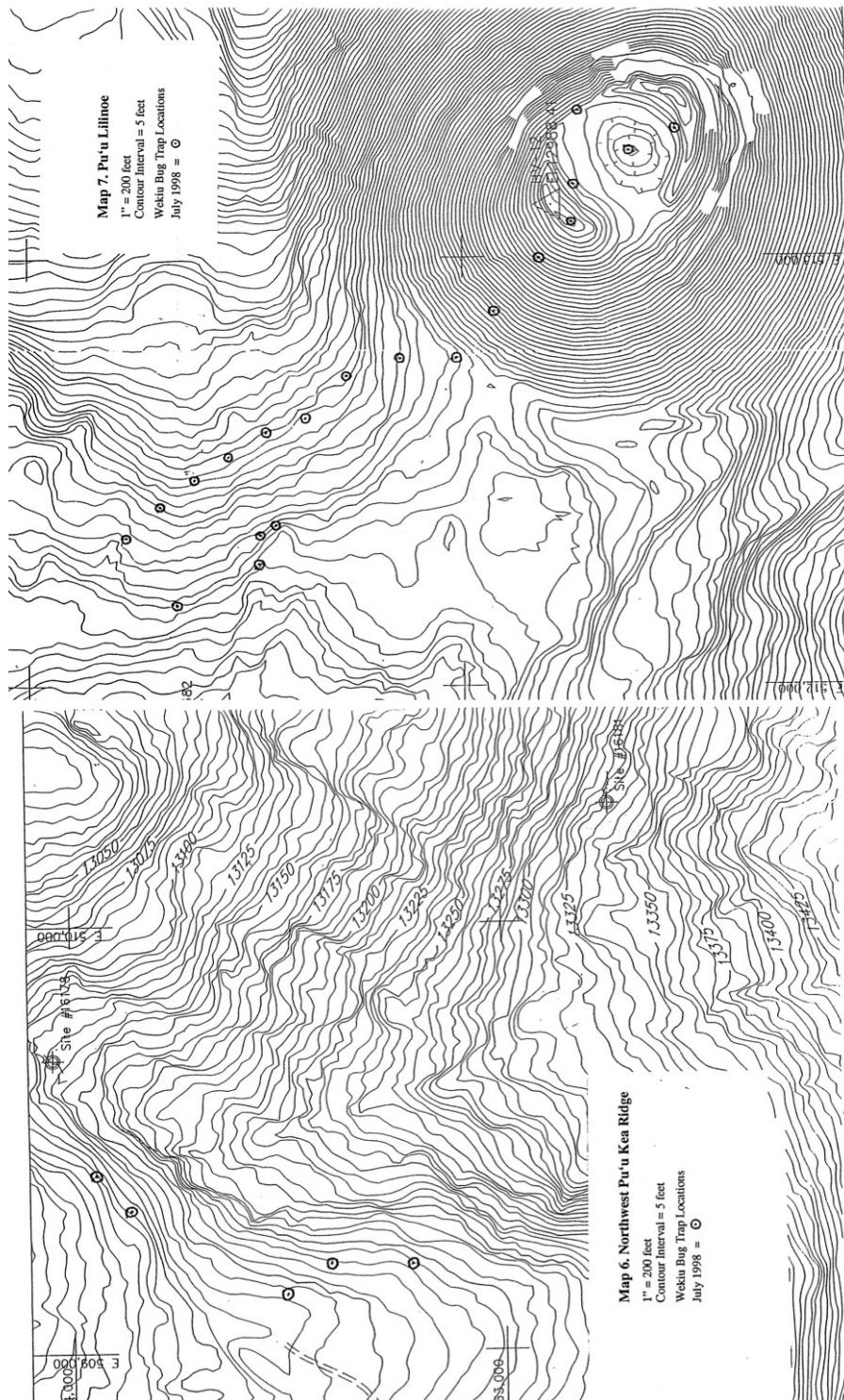
Figure 2.2-14: Howarth et al. 1997-8 arthropod survey locations: North Slope Plateau and Pu'u Mahoe.



Notes: Reproduced from: Howarth, F. G., G. J. Brenner and D. J. Preston. 1999. An arthropod assessment within selected areas of the Mauna Kea Science Reserve. Final Report. Prepared for the University of Hawaii Institute of Astronomy. Appendix J in Group 70. 2000. Mauna Kea Science Reserve Master Plan. Bishop Museum and Pacific Analytics, Honolulu. 65 p.

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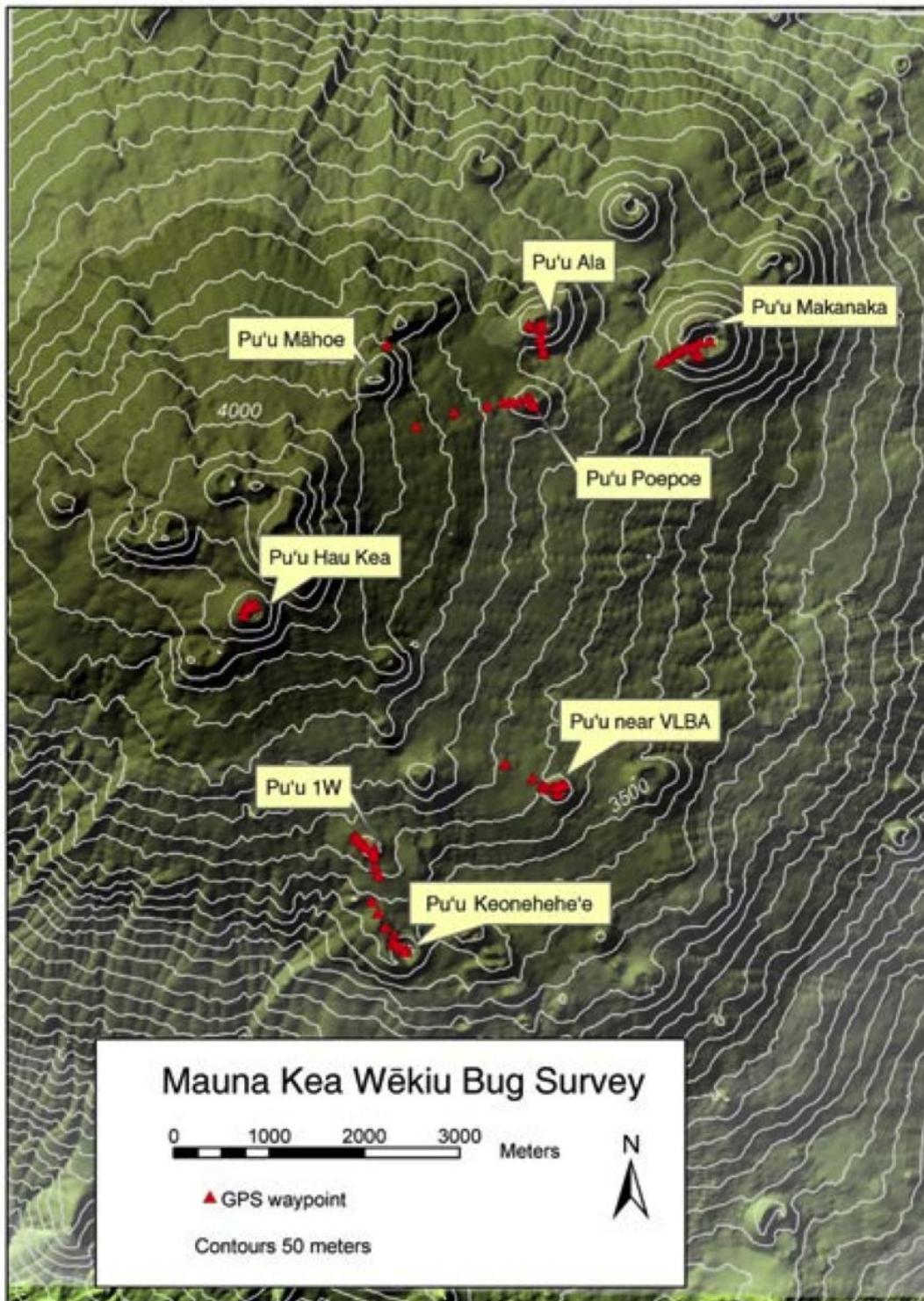
**Figure 2.2-15: Howarth et al. 1997-8 arthropod survey locations:
Northwest Pu'u Kea Ridge and Pu'u Lilinoe**



Notes: Reproduced from: Howarth, F. G., G. J. Brenner and D. J. Preston. 1999. An arthropod assessment within selected areas of the Mauna Kea Science Reserve. Final Report. Prepared for the University of Hawaii Institute of Astronomy. Appendix J in Group 70. 2000. Mauna Kea Science Reserve Master Plan. Bishop Museum and Pacific Analytics, Honolulu. 65 p.

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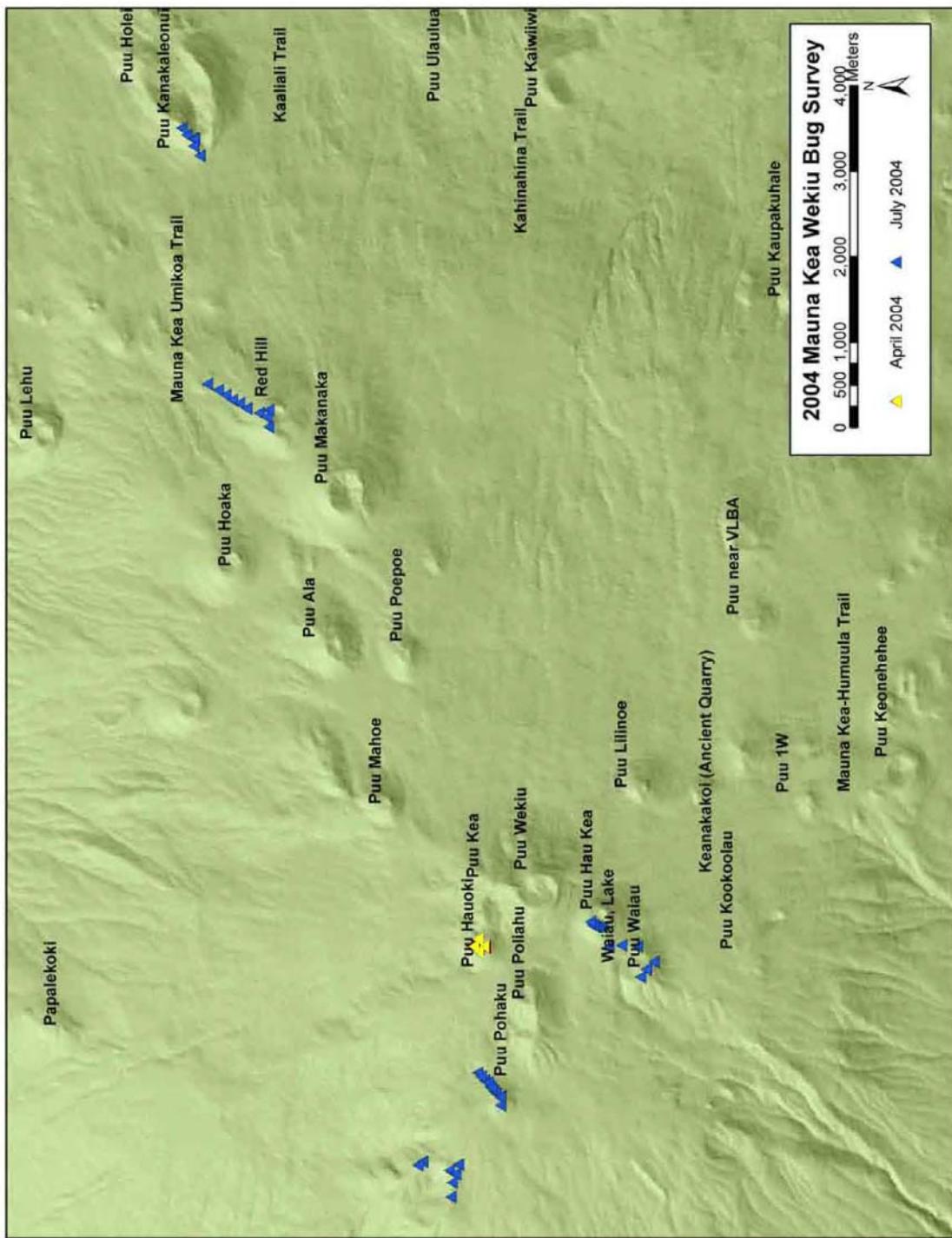
Figure 2.2-16: 2001 Wēkiu bug survey locations (Englund et al. 2002)



Notes: Reproduced from: Englund, R. A., D. A. Polhemus, F. G. Howarth and S. L. Montgomery. 2002. Range, habitat, and ecology of the Wēkiu bug (*Nysius wekiuicola*), a rare insect species unique to Mauna Kea, Hawai'i Island. Final report. Prepared for Office of Mauna Kea Management, University of Hawaii. Hawaii Biological Survey Report 2002-023. Bishop Museum, Honolulu. 49 p.

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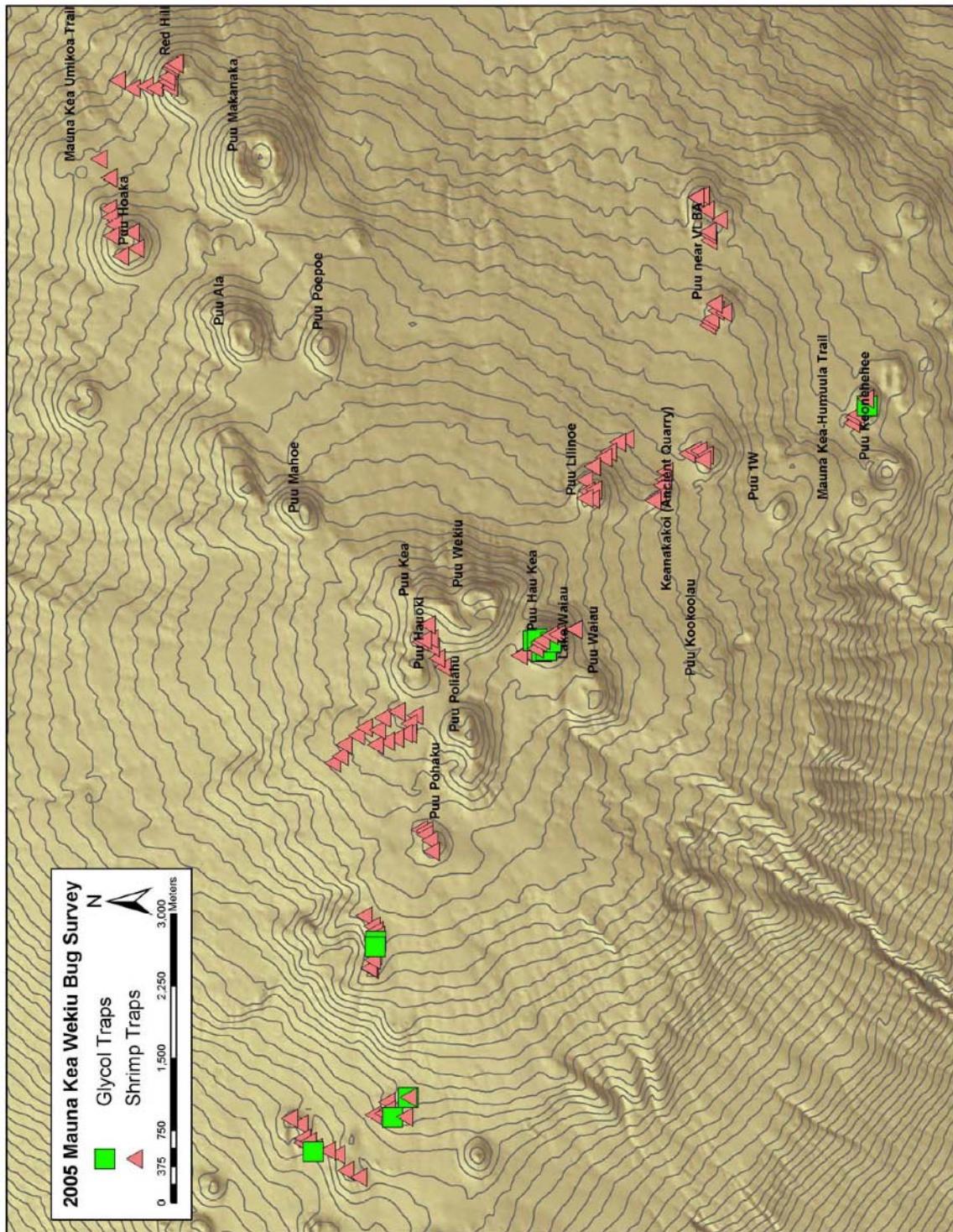
Figure 2.2-17: 2004 Wēkiu bug survey locations (Englund et al. 2005)



Notes: Reproduced from: Englund, R. A., A. Ramsdale, M. McShane, D. J. Preston, S. Miller and S. L. Montgomery. 2005. Results of 2004 Wēkiu Bug (*Nysius wekiuicola*) Surveys on Mauna Kea, Hawai'i Island. Final Report. Prepared for Office of Mauna Kea Management. Hawaii Biological Survey, Bishop Museum, Honolulu, HI. 37 p

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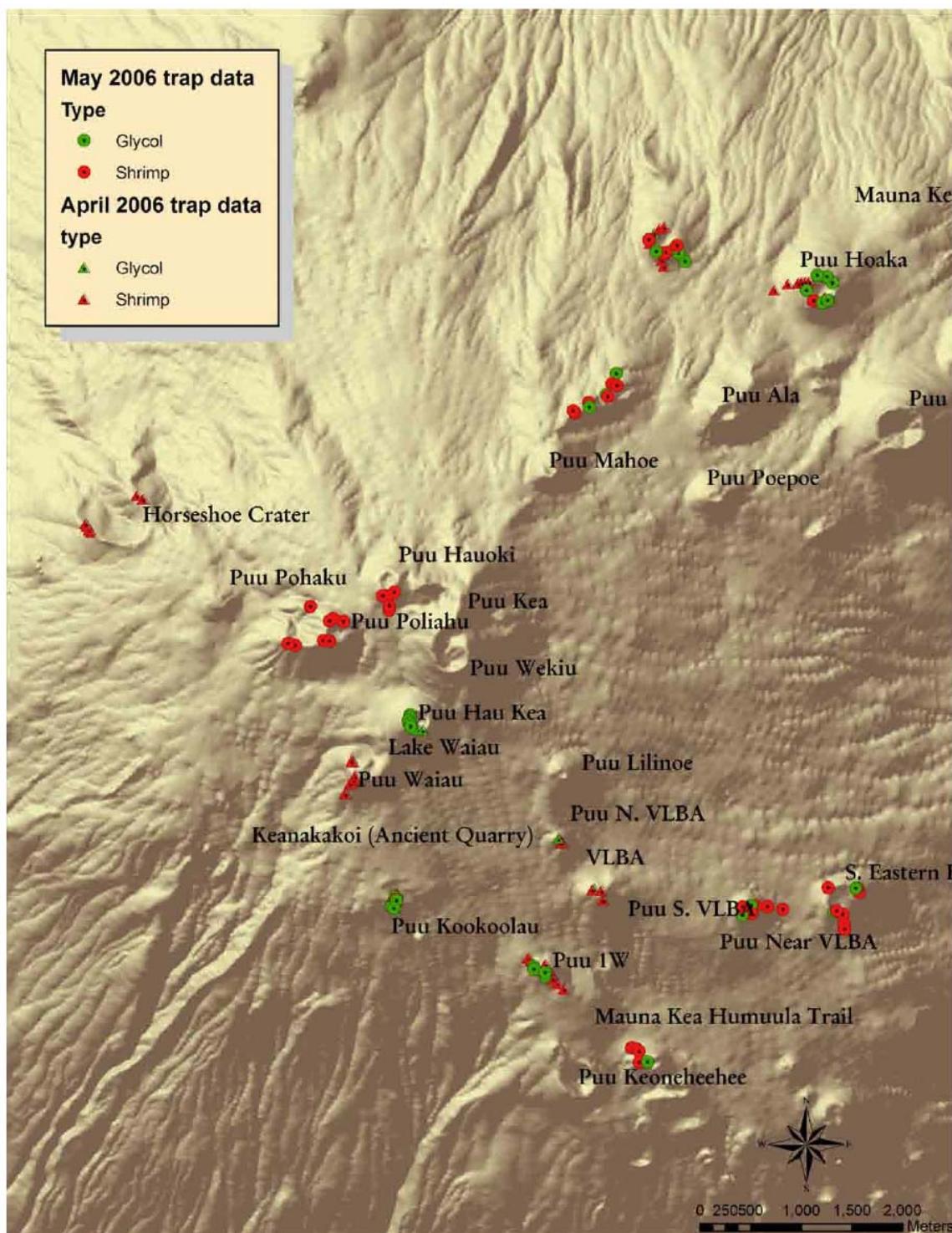
Figure 2.2-18: 2005 Wēkiu bug survey locations (Englund et al. 2006)



Notes: Reproduced from: Englund, R. A., A. E. Vorsino, H. M. Laederich, A. Ramsdale and M. McShane. 2006. Results of 2005 Wēkiu Bug (*Nysius wekiuicola*) Surveys on Mauna Kea, Hawai'i Island. Final Report. Prepared for Office of Mauna Kea Management. Hawaii Biological Survey Report 2006-010. Hawaii Biological Survey, Bishop Museum, Honolulu, HI. 63 p.

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Figure 2.2-19: 2006 Wēkiu bug survey locations (Englund et al. 2007)



Notes: Reproduced from: Englund, R. A., A. E. Vorsino and H. M. Laederich. 2007. Results of the 2006 Wēkiu Bug (*Nysius wekiuicola*) Surveys on Mauna Kea, Hawai'i Island. Final Report. Prepared for Office of Mauna Kea Management. Hawaii Biological Survey Report 2007-003. Hawaii Biological Survey, Bishop Museum, Honolulu, HI. 66 p.

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Figure 2.2-20: Wēkiu bug potential habitat

